

Page 1

Quality Control

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :			MRB (QSI042) Approval		
Description Work Order Deviation				Disposition				Completed By	
								Lead hand / Supervisor Approval Verification	
								QC / QA Coordinator Approval	
Root Cause Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐		Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐		FAULT CATEGORY Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabeled ☐ Fit/Function ☐ Misaligned/off center ☐		Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐			
OTHER : ☐									

Work Order ID 161995

Tuesday, May 23, 2017 11:06:31 AM

161995

Page 2

Item ID: D407-667-205TRN

Accept

N900040100

Setup Start

NS1

Revision ID:

Stop

NS2

Item Name: Crosstube Turning Detail

Start Date: 6/9/2017 Start Qty: 1.00

1

Cust Item ID:

Required Date: 6/29/2017 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan: _____

Date: _____

Tooling: _____

Date: _____

Run Start

NR1

QC: _____

Date: _____

SPC (Y/N): _____

Date: _____

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
120	MORI SEIKI CNC LATHE LARGE	0.00				1	Ø		DAS 23 9-89
120 Mori Seiki	Memo	2.56							
Mori Seiki CNC Lathe Large	1- Turn second taper on both side								
	2- Blend transition lines only with belte sander 60 grit, **Do not sand whole tube**: **Do not use sandpaper coarser than 320 grit.								
	FOLIO REV: <u>AA</u> DWG REV: <u>G</u>								
	3- Remove sand and plugs								
	4- Scribe part # and batch # using vibrating stylus on the cuff as per Dwg D407-667-245								
130	QC2- Inspect parts off machine FAI/FAIB	0.00				1	Ø		DAS 23 9-89
130 QC	Memo	0.00							DAS 23 9-89
Quality Control	Ultra sound the crosstube as per FAI. "wall thickness mesurment" at given location.								

17/6/26

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Approvals:

Process Plan: _____

Date: _____

Tooling: _____

Date: _____

Run Start

NR1

QC: _____

Date: _____

SPC (Y/N): _____

Date: _____

Stop

NR2

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
140	QC8- Inspect parts - second check	0.00				<u>1</u>	<u>Ø</u>		DAS 47 9-20
140									
QC	Memo	0.02							
Quality Control									17 06-26
145		0.06							
145									
Crosstubes	Memo	0.54							
Crosstubes	Grind off circumferential machining marks longitudinally.								
150		0.00							
150									
HandFXtube	Memo	1.27							
Hand Finishing Crosstubes	1- PRESSURE WASH X-TUBE INSIDE AND OUT								
	2- ALODINE AND ACID ETCH X-TUBE INSIDE AND OUT. USE RED SCOTCH BRITE								

DQA: _____ Date: _____



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Tuesday, May 23, 2017 11:06:31 AM

161995

Page 4

Item ID: D407-667-205TRN

Accept

N900040100Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Turning Detail

Start Date: 6/9/2017 Start Qty: 1.00

1

Cust Item ID:

Required Date: 6/29/2017 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
160	QC7-Inspect Chemical Conversion Coat	0.00				DAS 37 9-89			
160									
QC	Memo	0.01							
Quality Control									

17-07-03

170 0.00

170

Packaging

Packaging

Memo

Packaging

Identify and stock in kanban rackLocation:

1514

DP2 17-07-03

180 0.00

180

QC

QC21- Final Inspection - Work Order Release

Memo

Quality Control

0.10

17/7/3 48

DAS
21
9-89

JUL 03 2017

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Picklist Print

Monday, June 19, 2017 8:55:29 AM

Page 1

Work Order ID: 161995

161995

Parent Item: D407-667-205TRN

D407-667-205TRN

Parent Item Name: Crosstube Turning Detail

Start Date: 6/9/2017

Required Date: 6/29/2017

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:ec
IPP Rev B 08.04.02 Removed polish EC verified by: DD
IPP Rev:C 08-08-19 revE as per dwg DD verified by:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
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D6011-115

Manufactured

No

120

Each

59.0000

1

1

D6011-115

**

Crosstube Material

Location

Loc Qty

Loc Code

BACK HALL

19

139419

19

LG003

40

107880

12

123976

19

144447

9

DAS
23
9-89

17/6/20

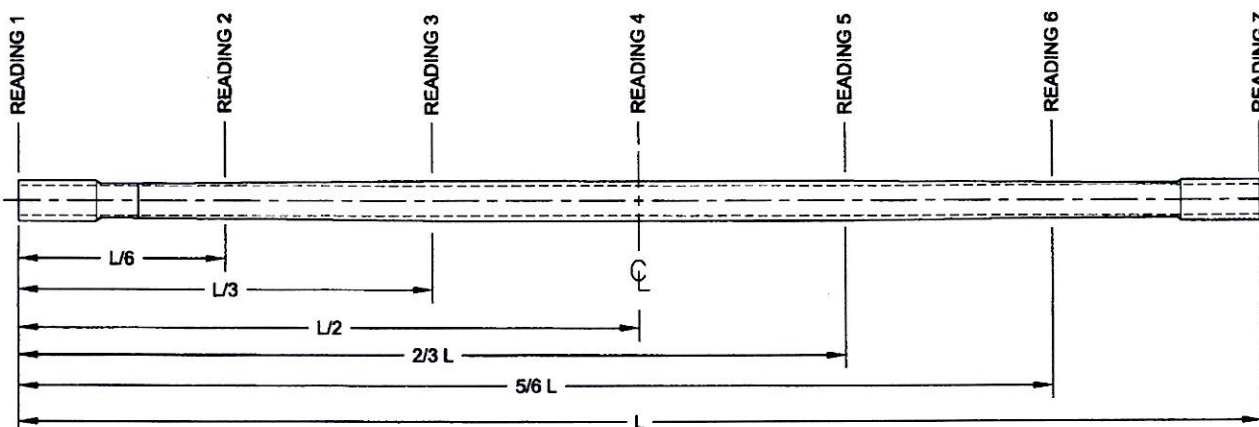
DART AEROSPACE LTD	Work Order:	161995
Description: Crosstube Assembly	Part Number:	D407-667-245
Inspection Dwg: D407-667-245 Rev: G		Page 1 of 2

FIRST ARTICLE INSPECTION CHECKLIST

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.490	+0.005/-0.000	2.495	✓		↑	
	1.832	+0.005/-0.000	1.836	✓			
	1.838	+0.005/-0.000	1.844	✓			
	1.892	+0.005/-0.000	1.897	✓			
	2.052	+0.005/-0.000	2.055	✓			
	2.206	+0.005/-0.000	2.211	✓			
	2.521	+0.005/-0.000	2.524	✓			
	2.633	+0.005/-0.000	2.636	✓			
	4.10	+/-0.030	4.10	✓		Vernier caliper	
	4.978	+/-0.030				tape	
	2.040	+0.000/-0.010	2.036	✓		↓	
	0.125	+/-0.010	0.125	✓		Vernier caliper	
	R0.063	+/-0.010	R0.063	✓		↓	
	R0.500	+/-0.010	R0.500	✓		R0	
						Vernier caliper	
SIDE B	2.490	+0.005/-0.000	2.492	✓		↑	
	1.832	+0.005/-0.000	1.835	✓			
	1.838	+0.005/-0.000	1.842	✓			
	1.892	+0.005/-0.000	1.895	✓			
	2.052	+0.005/-0.000	2.053	✓			
	2.206	+0.005/-0.000	2.212	✓			
	2.521	+0.005/-0.000	2.524	✓			
	2.633	+0.005/-0.000	2.636	✓			
	4.10	+/-0.030	4.10	✓		Vernier caliper	
	4.978	+/-0.030				tape	
	2.040	+0.000/-0.010	2.036	✓		↓	
	0.125	+/-0.010	0.135	✓		↑	
	R0.063	+/-0.010	R0.063	✓		Vernier caliper	
	R0.500	+/-0.010	R0.500	✓		R0	
						Vernier caliper	
	112.91	+/-0.020	112.91	✓		Tape	

DART AEROSPACE LTD	Work Order:	161991
Description: Crosstube Assembly	Part Number:	D407-667-245
Inspection Dwg: D407-667-245 Rev: G		Page 2 of 2

WALL THICKNESS MEASUREMENT



Location	WALL THICKNESS MEASUREMENT (IN)				Deviation Δw (max-min)	TOLERANCE
	w1 w4	w2 w1	w3 w2	w4 w3		
READING 1 L= 0"	234	236	233	234	0.003	0.075"
READING 2 L= 18.82	242	270	242	218	0.052	
READING 3 L= 37.64	410	439	412	388	0.051	
READING 4 L= 56.46	629	672	672	632	0.044	
READING 5 L= 75.28	398	428	423	395	0.033	
READING 6 L= 94.00	243	254	242	228	0.026	
READING 7 L= 112.91	237	236	234	236	0.003	

Calibration Result

Actual Block Thickness: 200-750

Sitescan 250 Measured Thickness: 200-750

Measured by:	DAS 23 9-89
Date:	17/6/26

Audited by:	DAS 47 9-89
Date:	17-06-26

Preliminary Approval:	
Date:	

Rev	Date	Change	Revised by	Approved
A	04.04.21	New Issue (P/O D407-667-205)	KJ/RF	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	06.03.30	Tolerance revised for 4.978 dimension	KJ/JLM	
D	07.02.19	Dwg Rev updated	KJ/JLM	
E	09.05.20	Dwg Rev updated	KJ	
F	12.06.04	Wall thickness form added	KJ	
G	15.05.14	Dwg Rev updated	KJ	

Item	QTY	PART NUMBER	DESCRIPTION
	-245		
	X	D407-667-245	CROSSTUBE ASSEMBLY (407 HIGH AFT)
1	1	D6011-115	CROSSTUBE
2	2	D2873-043	NUT PLATE
3	2	D2873-045	NUT PLATE
4	1	D2894-1	SUPPORT
5	2	D3190-1	CHAFING SHIELD
6	2	D3595-063-430	RUBBER CUSHION
7	14	MS20601AD4W8	RIVET (OR NAS9302B-4-8)
8	4	MS21920-22	CLAMP
9	2	MS21920-25	CLAMP (OR MS21920-24)
10	AR	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD
11	AR	PROSEAL 890	SEALANT

GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6011-115
FINISHED LENGTH = 112.91±0.020
- FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT CROSSTUBE PER DART QSI 005 4.2
FOR HATCHED AREAS (ZN A6-2), MASK AS REQUIRED
TO APPLY PRIME AND APPLY CLEAR COAT ONLY
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D407-667-245" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- WEIGHT: 27.7 lbs
- PART IS SYMMETRIC ABOUT CENTERLINE.
- RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- BEND PROGRESSIVELY WITH A MINIMUM OF 6 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- INSTALL D2894-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015. LET CURE FOR 24 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- INSTALL MS21920-25 CLAMPS WITH D3595-063-430 RUBBER CUSHIONS TO SECURE D2894-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
NOTE: MS21920-24 CLAMPS CAN BE USED TO ACCOMMODATE VARYING DIAMETERS. ENSURE THERE IS A MINIMUM OF 1.5 THREADS IN SAFETY ON THE NUTS.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3190-1 CHAFING SHIELDS AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEAL D3190-1 CHAFING SHIELDS ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.
- INSTALL D3190-1 CHAFING SHIELDS SO THAT OVERLAP IS 50 TO 70 DEGREES FROM BOTTOM OF CROSSTUBE OPPOSITE D2894-1 SUPPORT.
- TORQUE CLAMPS 80 TO 100 IN-LB. TORQUE CLAMPS ON D3190-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURED FOR 24 HOURS.

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WORK ORDER

NO. 161955 MJS
1705-24

G	INCORP. DEO'S D407-667-245-F1/F2 (ZN D8-1, A8-1, D5-2, B6-2, C6-2); 8.90 WAS 8.53 (ZN D5-2); TORQUE REDUCED FOR CHAFING SHIELD (ZN A8-1); FINISH REVISED TO ALLOW MANUFAC. FLEXIBILITY (ZN C8-1)	RF	15.03.20
F	REFORMAT NOTES TO NEW STANDARDS (ZN B8-1); RELOCATED FLAG # 6 (ZN A8-3) PER NCR 210; REMOVED REF. & ADD TOLERANCES (ZN C6-3, C4-3 & D2-3)	RF	08.11.06
E	8.02 AND 8.53 WERE 8.40 AND 8.90 (ZN D5-2); REORGANIZED VIEWS AND REFORMATED DRAWING TO CURRENT STANDARDS. REASONS: CLAMPS MOVED 0.375 TOWARD CL TO ELIMINATE INTERFERENCE WITH AIRCRAFT MOUNTS. REFERENCE: PAR#08-21 AND ECN#1225	MB	08.07.24
D	ADD VIEW FOR OEM SKID HOLES, ROTATE ORIENTATION OF CLAMPS SECTION F-F, REMOVE .851 ABRASION STRIP, ADD MAGNOBOND 6398, ADD CUSHION	PH	07.02.07
C	ADD HOLES AND NUT PLATES FOR COMPATIBILITY WITH BHT/AA SKIDTUBES	PH	05.07.26
B	ADD CHAFING SHIELD	CP	03.05.21
A	NEW ISSUE	CP	02.05.13
REV.	DESCRIPTION	BY	DATE
DESIGN	40	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	40	DRAWING NO.	REV. G
MFG. APPR.	40	D407-667-245	SHEET 1 OF 4
APPROVED	40	TITLE	SCALE
DE APPR.	40	CROSSTUBE ASS'Y (407 HIGH AFT)	NTS
DATE	15.03.20	COPYRIGHT © 2002 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

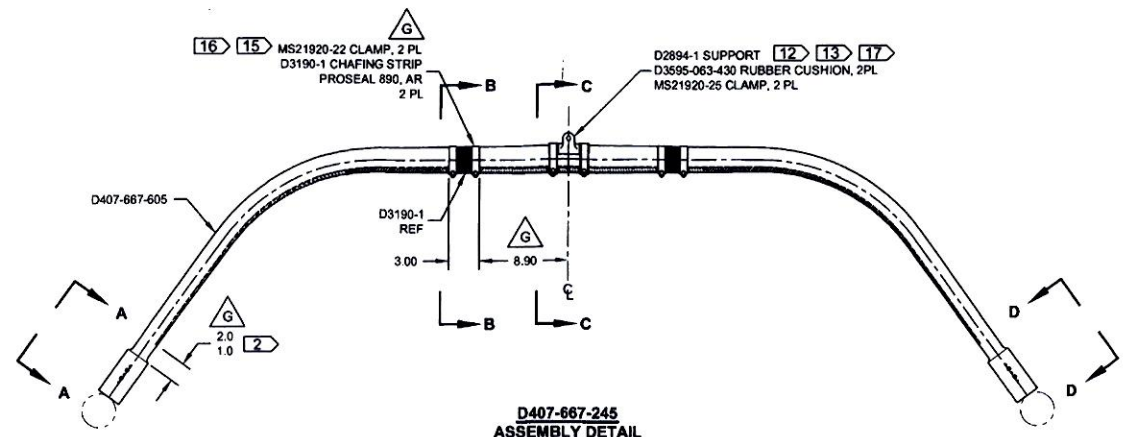
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2015 APR 09

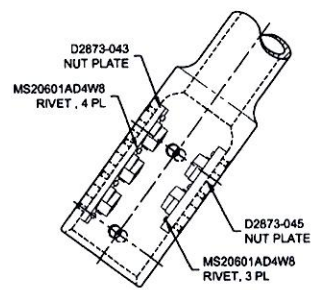
40 ECN 15-557

16 15 MS21920-22 CLAMP, 2 PL
D3190-1 CHAFING STRIP
PROSEAL 890, AR
2 PL

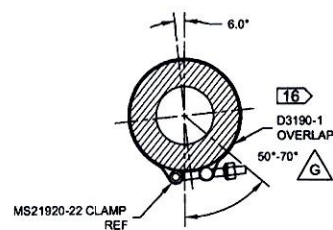
D2894-1 SUPPORT 12 13 17
D3595-063-430 RUBBER CUSHION, 2PL
MS21920-25 CLAMP, 2 PL



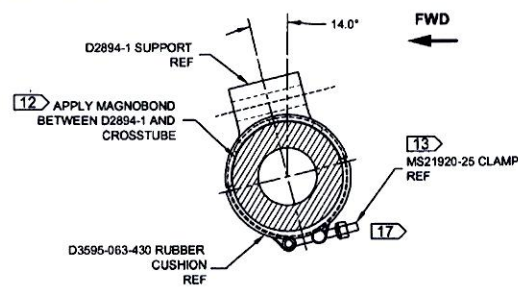
**D407-667-245
ASSEMBLY DETAIL
(VIEW LOOKING FWD)**



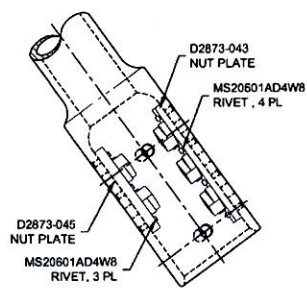
**VIEW A-A CUFF DETAIL
SCALE 4X**



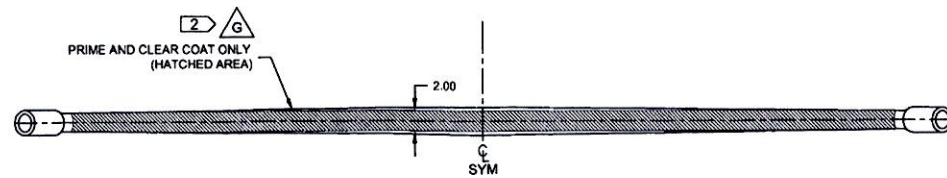
**SECTION B-B
SCALE 4X, 2PL**



**SECTION C-C
SCALE 4X**



**VIEW D-D CUFF DETAIL
SCALE 4X**



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2015 APR 09

DESIGN	4	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	4	DRAWING NO.	REV. G
MFG. APPR.	4	D407-667-245	SHEET 2 OF 4
APPROVED	4	TITLE	SCALE
DE APPR.	4	CROSSTUBE ASS'Y (407 HIGH AFT)	NTS
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